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Marathon Petroleum Company LP
1300 South Fort Street
Detroit, MI 48217

REPORT ON RATA & COMPLIANCE TESTING


Performed for:
MARATHON PETROLEUM COMPANY LP
DETROIT REFINERY

CCR INTERHEATER STACK (14H1-4)


Client Reference No: 4100356132
CleanAir Project No: 12783-2
Revision 0: September 14, 2015

To the best of our knowledge, the data presented in this report are accurate, complete, error free, legible and representative of the actual emissions during the test program. Clean Air Engineering operates in conformance with the requirements of ASTM D7036-04 Standard Practice for Competence of Air Emission Testing Bodies.

Submitted by,


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**RENEWABLE OPERATING PERMIT
REPORT CERTIFICATION**

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Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.

Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating Permit (ROP) program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as specified in Rule 213(3)(b)(ii), and be made available to the Department of Natural Resources and Environment, Air Quality Division upon request.

Source Name Marathon Petroleum Company LP County Wayne

Source Address 1300 South Fort Street City Detroit

AQD Source ID (SRN) A9831 ROP No. MI-ROP-A9831-2012b ROP Section No. 01

Please check the appropriate box(es):

Annual Compliance Certification (Pursuant to Rule 213(4)(c))

Reporting period (provide inclusive dates): From _____ To _____

1. During the entire reporting period, this source was in compliance with ALL terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference. The method(s) used to determine compliance is/are the method(s) specified in the ROP.

2. During the entire reporting period this source was in compliance with all terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference, EXCEPT for the deviations identified on the enclosed deviation report(s). The method used to determine compliance for each term and condition is the method specified in the ROP, unless otherwise indicated and described on the enclosed deviation report(s).

Semi-Annual (or More Frequent) Report Certification (Pursuant to Rule 213(3)(c))

Reporting period (provide inclusive dates): From _____ To _____

1. During the entire reporting period, ALL monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred.

2. During the entire reporting period, all monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred, EXCEPT for the deviations identified on the enclosed deviation report(s).

Other Report Certification

Reporting period (provide inclusive dates): From 7/21/2015 To 8/25/2015

Additional monitoring reports or other applicable documents required by the ROP are attached as described:
Submittal of the CCR Charge and InterHeater Compliance Testing results.

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete

David Roland MPC Investment LLC, 313-843-9100
Name of Responsible Official (print or type) its General Partner Title Deputy Assistant Secretary Phone Number

[Signature] 9/18/2015
Signature of Responsible Official Date

PROJECT OVERVIEW

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INTRODUCTION

Marathon Petroleum Company LP (MPC) contracted Clean Air Engineering (Clean Air) to perform emission measurements at the Detroit refinery for relative accuracy test-audit (RATA) and compliance purposes.

All testing was conducted in accordance with the regulations set-forth by the United States Environmental Protection Agency (USEPA) and the Michigan Department of Environmental Quality (DEQ). The permit limits are referenced in Michigan Department of Environmental Quality, Air Quality Division Permit to Install No. 63-08D, issued May 12, 2014.

Key Project Participants

Individuals responsible for coordinating and conducting the test program were:

Crystal Davis – MPC
Joe Reidy – MPC
Chad Eilering – CleanAir

Test Program Parameters

Testing was performed at the CCR Interheater (Heater ID 14H1-4, Emission Unit ID EU14-CCRPLINTHTR-S1, Stack ID SV14-H4A) on July 23-24 and July 29, 2015, and included the following emissions measurements:

- particulate matter (PM), assumed equivalent to filterable particulate matter (FPM) only
- volatile organic compounds (VOCs), assumed equivalent to total hydrocarbons (THCs) minus the following constituents:
 - methane (CH₄)
 - ethane (C₂H₆)
- nitrogen oxides (NO_x)
- carbon monoxide (CO)
- flue gas composition (e.g., O₂, CO₂, H₂O)
- flue gas flow rate

PROJECT OVERVIEW

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TEST PROGRAM SYNOPSIS**Test Schedule**

The on-site schedule followed during the test program is outlined in Table 1-1.

**Table 1-1:
Schedule of Activities**

Run Number	Location	Method	Analyte	Date	Start Time	End Time
1	CCR Interheater Stack	USEPA Method 5	FPM	07/23/15	11:28	13:34
2	CCR Interheater Stack	USEPA Method 5	FPM	07/23/15	14:38	17:21
3	CCR Interheater Stack	USEPA Method 5	FPM	07/23/15	18:03	20:08
1	CCR Interheater Stack	USEPA Method 3A/7E/10	O ₂ /CO ₂ /NO _x /CO	07/23/15	11:28	11:49
2	CCR Interheater Stack	USEPA Method 3A/7E/10	O ₂ /CO ₂ /NO _x /CO	07/23/15	12:03	12:24
3	CCR Interheater Stack	USEPA Method 3A/7E/10	O ₂ /CO ₂ /NO _x /CO	07/23/15	13:18	13:39
4	CCR Interheater Stack	USEPA Method 3A/7E/10	O ₂ /CO ₂ /NO _x /CO	07/23/15	14:51	15:12
5	CCR Interheater Stack	USEPA Method 3A/7E/10	O ₂ /CO ₂ /NO _x /CO	07/23/15	15:24	15:45
6	CCR Interheater Stack	USEPA Method 3A/7E/10	O ₂ /CO ₂ /NO _x /CO	07/23/15	15:57	16:18
7	CCR Interheater Stack	USEPA Method 3A/7E/10	O ₂ /CO ₂ /NO _x /CO	07/23/15	16:28	16:49
8	CCR Interheater Stack	USEPA Method 3A/7E/10	O ₂ /CO ₂ /NO _x /CO	07/23/15	17:02	17:23
9	CCR Interheater Stack	USEPA Method 3A/7E/10	O ₂ /CO ₂ /NO _x /CO	07/23/15	17:41	18:02
10	CCR Interheater Stack	USEPA Method 3A/7E/10	O ₂ /CO ₂ /NO _x /CO	07/23/15	18:14	18:35
11	CCR Interheater Stack	USEPA Method 3A/7E/10	O ₂ /CO ₂ /NO _x /CO	07/23/15	18:58	19:19
12	CCR Interheater Stack	USEPA Method 3A/7E/10	O ₂ /CO ₂ /NO _x /CO	07/23/15	19:30	19:51
1	CCR Interheater Stack	USEPA Method 3A/18/25A	O ₂ /CO ₂ /CH ₄ /C ₂ H ₆ /THC	07/23/15	11:28	13:39
2	CCR Interheater Stack	USEPA Method 3A/18/25A	O ₂ /CO ₂ /CH ₄ /C ₂ H ₆ /THC	07/23/15	14:51	16:18
3	CCR Interheater Stack	USEPA Method 3A/18/25A	O ₂ /CO ₂ /CH ₄ /C ₂ H ₆ /THC	07/23/15	16:28	18:02
4	CCR Interheater Stack	USEPA Method 3A/18/25A	O ₂ /CO ₂ /CH ₄ /C ₂ H ₆ /THC	07/23/15	18:14	19:51
4	CCR Interheater Stack	USEPA Method 5	FPM	07/24/15	08:37	10:45
5	CCR Interheater Stack	USEPA Method 5	FPM	07/24/15	11:25	13:30
6	CCR Interheater Stack	USEPA Method 5	FPM	07/29/15	08:57	11:01
7	CCR Interheater Stack	USEPA Method 5	FPM	07/29/15	11:43	13:46
8	CCR Interheater Stack	USEPA Method 5	FPM	07/29/15	14:47	19:32

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PROJECT OVERVIEW**Results Summary**

Tables 1-2 and 1-3 summarize the results of the test program. A more detailed presentation of the test conditions and results of analysis are shown on pages 2-1 through 2-12.

**Table 1-2:
Summary of Emission Compliance Test Results**

<u>Source</u>				
Constituent (Units)	Sampling Method	Average Emission	Permit Limit ¹	
<u>CCR Interheater Stack</u>				
PM (lb/MMBtu) ²	USEPA 5	0.0033	0.0019	
PM (lb/MMBtu) ³	USEPA 5	0.0011	0.0019	
VOC (lb/MMBtu)	USEPA 18 / 25A	<6.0E-04	0.0055	
NO _x (lb/MMBtu)	USEPA 7E	0.03	0.05	
CO (lb/MMBtu)	USEPA 10	<3.9E-04	0.013	

¹ Permit limits obtained from MDEQ Permit To Install No. 63-08D.

² Includes the average of 5 test runs performed during mobilization 1 on July 23-24, 2015.

³ Includes the average of 3 test runs performed during mobilization 2 on July 29, 2015.

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**Table 1-3:
Summary of RATA Results**

<u>Source</u>				
Constituent (Units)	Reference Method (USEPA)	Applicable Specification	Relative Accuracy ¹	Specification Limit ²
<u>CCR Interheater Stack</u>				
O ₂ (% dv)	3A	PS3	0.4	±1.0% dv
NO _x (lb/MMBtu)	7E	PS2	0.0	20% of RM
CO (lb/MMBtu)	10	PS4A ³	0.0	5% of Standard

¹ Relative Accuracy is expressed in terms of comparison to the reference method (% RM) or applicable emission standard (% Std.).

² Specification limits obtained from 40 CFR 60, Appendix B, Performance Specifications.

³ For any sources emitting less than 200 ppmv of CO, PS4A applies. The PS4A RA limit is either < 10% of RM, < 5% of Standard, or ± 5 ppmv (abs. average difference plus 2.5 x confidence coefficient).

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PROJECT OVERVIEW

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Discussion of Test Program***FPM Testing - USEPA Method 5***

For this test program, PM emission rate is assumed equivalent to FPM emission rate. FPM testing occurred over two separate mobilizations.

Five (5) 120-minute Method 5 test runs were performed during the first mobilization on July 23-24, 2015. The original plan outlined a total of three (3) tests to be performed however, following test Runs 1 and 2 there were visible fragments of particulate on the front half filter samples. Upon review of the samples on-site, MPC requested an additional two (2) test runs to be performed. The final result was expressed as the average of five (5) valid runs and was above the permit limit for PM.

Upon analysis, the laboratory found what is believed to be glass chips in the front half sample rinse of Run 2. The results as received were used to calculate the final results.

During and following the test program, MPC explored reasoning on why particulate levels were higher than expected for this gas-fired heater. MPC performed a purge of the system prior to the second mobilization.

Three (3) 120-minute Method 5 test runs were performed during the second mobilization on July 29, 2015. The final result was expressed as the average of three (3) valid runs and was below the permit limit for PM.

Method 5 Run 8 paused sampling approximately 74 minutes into the run because of severe weather warnings. The delay lasted approximately 60-minutes before testing was resumed. The metering console being used was switched out shortly after the test run re-started due to circuit malfunctioning causing another approximately 60 minute delay. The difference in the dry gas meter calibration factors from the change in meter consoles was accounted for during the final calculations.

O₂, NO_x, and CO Emissions / RATA Testing - USEPA Methods 3A, 7E, and 10; Performance Specifications 2, 3 and 4/4A

Minute-average data points for O₂, NO_x and CO (dry basis) were collected over a period of 21 minutes for each RATA Reference Method (RM) run. The average result for each RM run was calculated and compared to the average result from the facility's CEMS over an identical time interval in order to calculate relative accuracy (RA).

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Twelve (12) RATA test runs were performed at the CCR Interheater Stack on July 23, 2015. RATA Run 2 is not considered valid because the heated sampling system malfunctioned during the test which led to a failed bias check following the test run. The problem was resolved, and the sampling system temperatures were allowed to stabilize prior to beginning Run 3. Run 2 was not used in any of the final calculations.

RATA Run 10 for CO is not considered valid because the bias check following the test run did not meet QA/QC criteria. During the upper level gas bias check the system did not record consecutive stable readings. Run 10 was not used in any of the final calculations for CO.

The final results for the RATA were expressed utilizing 9 or 10 valid best fit test runs and the results are as follows:

- For O₂, RA is expressed as the average absolute difference between the RM and facility CEMS runs. The final result was below the limit of $\pm 1.0\%$ dv set by PS3.
- For NO_x (ppmdv), RA is expressed as the percent difference between RM and facility CEMS runs. The final result was below the limit of 20% (as % of RM) set by PS2.
- For NO_x (lb/MMBtu), RA is expressed as the percent difference between RM and facility CEMS runs. The final result was below the limit of 20% (as % of RM) set by PS2.
- For CO (ppmdv), the RA is expressed as the average absolute difference between the RM and facility CEMS runs, plus the 2.5% confidence coefficient. The final result was below the limit of ± 5 ppmdv set by PS4A.
- For CO (lb/MMBtu), RA is expressed as the percent difference between RM and the facility CEMS. The final result was below the limit of 5% (as % of applicable emission standard) set by PS4A.

Reference method and facility RATA test run averages which were negative were treated as zero when calculating the relative accuracy.

The facility CEMS results as lb/MMBtu were calculated and provided by MPC along with all other applicable RATA and process data and can be found in Appendix H.

RM NO_x and CO results from the RATA were used to demonstrate compliance with permit limits. The final results were expressed as the average of 10 valid runs for CO and 11 valid runs for NO_x. The final results were below the permit limits for NO_x and CO.

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CleanAir measured CO drift-corrected concentrations which were negative and consequently below the assumed detection limit of 1% of the instrument calibration span for all test runs. The worst-case concentration results used to calculate mass-based emissions in regards to the emission compliance test is defined as some number "less than" 1% of the calibration span. The RM CO values utilized for the RATA were treated as zero.

VOC Testing - USEPA Methods 25A and 18

VOC testing was performed concurrently with the RATA testing. Twelve (12) 21-minute Method 25 test runs for THCs were performed concurrently with four (4) Method 18 bag collections for CH₄ and C₂H₆, with each Method 18 sample collected over a period of about 63 minutes.

The Method 18 samples on the CCR Interheater were collected as follows:

- Method 18 Run 1: Collected during Method 25A Runs 1, 2 and 3
- Method 18 Run 2: Collected during Method 25A Runs 4, 5 and 6
- Method 18 Run 3: Collected during Method 25A Runs 7, 8 and 9
- Method 18 Run 4: Collected during Method 25A Runs 10, 11 and 12

Method 18 Run 1, comprised of Method 25A Runs 1 through 3, was not used in the final results calculations because of the heated sample system issue which also invalidated Method 25A Run 2. Following Method 25A Run 3, the THC analyzer was recalibrated prior to starting Run 4.

VOC emission rate is normally equivalent to THC emission rate, minus CH₄ and C₂H₆ emission rate (lb/MMBtu for all constituents). For CH₄ and C₂H₆, a non-detectable result was obtained for all runs, so no correction was made to the THC results. Therefore, VOC emissions are equivalent to THC emissions. The final results were expressed as the average of three (3) valid runs, Runs 2 through 4, and were below the permit limit.

Calculation of Final Results

Emission results in units of dry volume-based concentration (lb/dscf, ppmdv) were converted to units of pounds per million Btu (lb/MMBtu) by calculating an oxygen-based fuel factor (F_d) for refinery gas per USEPA Method 19 specifications. The heat content and F_d factor were calculated from percent volume composition analytical data provided by MPC and tabulated heating values for each of the measured constituents.

Fuel gas analyses were performed by MPC on each test day and results were provided to CleanAir.

End of Section 1 – Project Overview

RESULTS**Table 2-1:
CCR Interheater Stack – FPM Emissions (USEPA 5) – Runs 1-5**

Run No.	1	2	3
Date (2015)	Jul 23	Jul 23	Jul 23
Start Time (approx.)	11:28	14:38	18:03
Stop Time (approx.)	13:34	17:21	20:08
Process Conditions			
P ₁ Fuel gas flow rate (Mscf/day)	1,961	2,261	2,309
P ₂ Charge rate (bpd)	18,067	20,720	21,001
F _d Oxygen-based F-factor (dscf/MMBtu)	8,315	8,315	8,315
H _i Heat input (MMBtu/hr)	91.0	105	107
Cap Capacity factor (hours/year)	8,760	8,760	8,760
Gas Conditions			
O ₂ Oxygen (dry volume %)	7.0	5.1	4.6
CO ₂ Carbon dioxide (dry volume %)	7.9	9.0	9.3
T _s Sample temperature (°F)	533	540	542
B _w Actual water vapor in gas (% by volume)	14.3	15.9	16.4
Gas Flow Rate			
Q _a Volumetric flow rate, actual (acfm)	51,800	46,100	49,200
Q _s Volumetric flow rate, standard (scfm)	27,000	23,800	25,400
Q _{std} Volumetric flow rate, dry standard (dscfm)	23,100	20,000	21,200
Q _a Volumetric flow rate, actual (acf/hr)	3,110,000	2,760,000	2,950,000
Q _s Volumetric flow rate, standard (scf/hr)	1,620,000	1,430,000	1,520,000
Q _{std} Volumetric flow rate, dry standard (dscf/hr)	1,390,000	1,200,000	1,270,000
Sampling Data			
V _{std} Volume metered, standard (dscf)	79.82	70.46	75.74
%I Isokinetic sampling (%)	100.0	102.0	102.8
Laboratory Data			
m _n Total FPM (g)	0.01759	0.02017	0.00353
n _{MDL} Number of non-detectable fractions	N/A	N/A	N/A
DLC Detection level classification	ADL	ADL	ADL
FPM Results			
C _{std} Particulate Concentration (lb/dscf)	4.86E-07	6.31E-07	1.03E-07
E _{lb/hr} Particulate Rate (lb/hr)	0.675	0.759	0.131
E _{T/yr} Particulate Rate (Ton/yr)	2.96	3.32	0.573
E _{Fd} Particulate Rate - F _d -based (lb/MMBtu)	0.00607	0.00694	0.00110

Detection level classifications are defined as follows:

ADL = Above Detection Level - all fractions are above detection limit

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RESULTS**Table 2-1 (Continued):
CCR Interheater Stack – FPM Emissions (USEPA 5) – Runs 1-5**

Run No.		4	5	Average
Date (2015)		Jul 24	Jul 24	
Start Time (approx.)		08:37	11:25	
Stop Time (approx.)		10:45	13:30	
Process Conditions				
P ₁	Fuel gas flow rate (Mscf/day)	2,244	2,242	2,203
P ₂	Charge rate (bpd)	20,999	20,998	20,357
F _d	Oxygen-based F-factor (dscf/MMBtu)	8,316	8,316	8,316
H _i	Heat input (MMBtu/hr)	104	104	102
Cap	Capacity factor (hours/year)	8,760	8,760	8,760
Gas Conditions				
O ₂	Oxygen (dry volume %)	5.0	5.0	5.3
CO ₂	Carbon dioxide (dry volume %)	9.2	9.2	8.9
T _s	Sample temperature (°F)	542	539	539
B _w	Actual water vapor in gas (% by volume)	15.9	16.2	15.7
Gas Flow Rate				
Q _a	Volumetric flow rate, actual (acfm)	47,300	46,200	48,120
Q _s	Volumetric flow rate, standard (scfm)	24,400	23,900	24,900
Q _{std}	Volumetric flow rate, dry standard (dscfm)	20,600	20,000	20,980
Q _a	Volumetric flow rate, actual (acf/hr)	2,840,000	2,770,000	2,886,000
Q _s	Volumetric flow rate, standard (scf/hr)	1,470,000	1,440,000	1,496,000
Q _{std}	Volumetric flow rate, dry standard (dscf/hr)	1,230,000	1,200,000	1,258,000
Sampling Data				
V _{std}	Volume metered, standard (dscf)	73.54	71.30	74.17
%I	Isokinetic sampling (%)	103.1	102.5	102.1
Laboratory Data				
m _n	Total FPM (g)	0.00466	0.00322	0.00983
n _{MDL}	Number of non-detectable fractions	N/A	N/A	
DLC	Detection level classification	ADL	ADL	
FPM Results				
C _{sd}	Particulate Concentration (lb/dscf)	1.40E-07	9.96E-08	2.92E-07
E _{lb/hr}	Particulate Rate (lb/hr)	0.172	0.120	0.371
E _{T/yr}	Particulate Rate (Ton/yr)	0.755	0.525	1.63
E _{Fd}	Particulate Rate - F _d -based (lb/MMBtu)	0.00153	0.00109	0.00335

Average includes 5 runs.

Detection level classifications are defined as follows:

ADL = Above Detection Level - all fractions are above detection limit

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RESULTS

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**Table 2-2:
CCR Interheater Stack – FPM Emissions (USEPA 5) – Runs 6-8**

Run No.		6	7	8	Average
Date (2015)		Jul 29	Jul 29	Jul 29	
Start Time (approx.)		08:57	11:43	14:47	
Stop Time (approx.)		11:01	13:46	19:32	
Process Conditions					
P ₁	Fuel gas flow rate (Mscf/day)	2,512	2,539	2,529	2,527
P ₂	Charge rate (bpd)	21,001	21,001	21,001	21,001
F _d	Oxygen-based F-factor (dscf/MMBtu)	8,327	8,327	8,327	8,327
H _i	Actual heat input (MMBtu/hr)	117	119	118	118
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Conditions					
O ₂	Oxygen (dry volume %)	5.8	5.6	6.0	5.8
CO ₂	Carbon dioxide (dry volume %)	8.4	8.5	8.3	8.4
T _s	Sample temperature (°F)	569	566	569	568
B _w	Actual water vapor in gas (% by volume)	15.0	15.6	15.8	15.5
Gas Flow Rate					
Q _a	Volumetric flow rate, actual (acfm)	58,700	57,100	58,500	58,100
Q _s	Volumetric flow rate, standard (scfm)	29,400	28,800	29,300	29,200
Q _{std}	Volumetric flow rate, dry standard (dscfm)	25,000	24,300	24,700	24,700
Q _a	Volumetric flow rate, actual (acf/hr)	3,520,000	3,430,000	3,510,000	3,490,000
Q _s	Volumetric flow rate, standard (scf/hr)	1,770,000	1,730,000	1,760,000	1,750,000
Q _{std}	Volumetric flow rate, dry standard (dscf/hr)	1,500,000	1,460,000	1,480,000	1,480,000
Sampling Data					
V _{mstd}	Volume metered, standard (dscf)	70.01	68.12	69.19	69.11
%I	Isokinetic sampling (%)	102.4	102.7	102.6	102.6
Laboratory Data					
m _n	Total FPM (g)	0.00401	0.00260	0.00213	
n _{MDL}	Number of non-detectable fractions	N/A	N/A	N/A	
DLC	Detection level classification	ADL	ADL	ADL	
FPM Results					
C _{sd}	Particulate Concentration (lb/dscf)	1.26E-07	8.42E-08	6.79E-08	9.28E-08
E _{lb/hr}	Particulate Rate (lb/hr)	0.190	0.123	0.101	0.138
E _{T/yr}	Particulate Rate (Ton/yr)	0.830	0.537	0.440	0.603
E _{Fd}	Particulate Rate - F _d -based (lb/MMBtu)	0.00146	0.000957	0.000793	0.00107

Average includes 3 runs.

Detection level classifications are defined as follows:

ADL = Above Detection Level - all fractions are above detection limit

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RESULTS**Table 2-3:
CCR Interheater Stack – THC, CH₄, C₂H₆ & VOC Emissions (USEPA 25A/18)**

Run No.		2	3	4	Average
Date (2015)		Jul 23	Jul 23	Jul 23	
Start Time (approx.)		14:51	16:28	18:14	
Stop Time (approx.)		16:18	18:02	19:51	
Process Conditions					
P ₁	Fuel gas flow rate (Mscf/day)	2,247	2,312	2,305	2,288
P ₂	Charge rate (bpd)	20,742	20,999	21,000	20,914
F _d	Oxygen-based F-factor (dscf/MMBtu)	8,315	8,315	8,315	8,315
H _i	Actual heat input (MMBtu/hr)	104	107	107	106
Gas Conditions					
O ₂	Oxygen (dry volume %)	4.8	4.4	4.3	4.5
CO ₂	Carbon dioxide (dry volume %)	9.4	9.6	9.7	9.6
B _w	Actual water vapor in gas (% by volume) ¹	15.9	15.9	16.4	16.1
THC Results					
C _{sd}	Concentration (ppmdv as C ₃ H ₈)	<0.496	<0.496	<0.499	<0.497
C _{sd}	Concentration (lb/dscf)	<5.67E-08	<5.67E-08	<5.71E-08	<5.69E-08
E _{Fd}	Emission Rate - F _d -based (lb/MMBtu)	<6.14E-04	<5.98E-04	<5.98E-04	<6.04E-04
Methane Results					
C _{sd}	Concentration (ppmdv)	<0.105	<0.105	<0.105	<0.105
C _{sd}	Concentration (lb/dscf)	<4.37E-09	<4.37E-09	<4.37E-09	<4.37E-09
E _{Fd}	Emission Rate - F _d -based (lb/MMBtu)	<4.73E-05	<4.61E-05	<4.58E-05	<4.64E-05
Ethane Results					
C _{sd}	Concentration (ppmdv)	<0.0823	<0.0823	<0.0823	<0.08
C _{sd}	Concentration (lb/dscf)	<6.42E-09	<6.42E-09	<6.42E-09	<6.42E-09
E _{Fd}	Emission Rate - F _d -based (lb/MMBtu)	<6.95E-05	<6.77E-05	<6.73E-05	<6.82E-05
VOC Results					
E _{Fd}	Emission Rate - F _d -based (lb/MMBtu)	<6.14E-04	<5.98E-04	<5.98E-04	<6.04E-04

Average includes 3 runs.

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¹ Moisture data used for ppmwv to ppmdv correction obtained from nearly-concurrent M-5 runs.

For THC '<' indicates a measured response below the detection limit (assumed to be 1% of the instrument calibration span).

For methane and ethane, '<' indicates a measured response below the analytical detection limit determined by the laboratory.

For VOCs, '<' indicates at least one non-detectable fraction was used in the calculations. '<' values for methane and ethane are treated as the entire value of the analytical detection limit.

RESULTS

2-5

**Table 2-4:
CCR Interheater Stack – CO & NO_x Emissions (USEPA 7E/10)**

Run No.		1	3	4	5
Date (2015)		Jul 23	Jul 23	Jul 23	Jul 23
Start Time (approx.)		11:28	13:18	14:51	15:24
Stop Time (approx.)		11:49	13:39	15:12	15:45
Process Conditions					
P ₁	Fuel gas flow rate (Mscf/day)	1,950	2,001	2,144	2,280
P ₂	Charge rate (bpd)	17,998	18,374	19,972	21,007
F _d	Oxygen-based F-factor (dscf/MMBtu)	8,315	8,315	8,315	8,315
H _i	Actual heat input (MMBtu/hr)	90.5	92.8	99.5	106
Gas Conditions					
O ₂	Oxygen (dry volume %)	6.9	6.5	5.5	4.6
CO ₂	Carbon dioxide (dry volume %)	8.3	8.5	9.1	9.6
Nitrogen Oxides Results					
C _{sd}	Concentration (ppmdv)	23.1	23.4	20.9	19.7
C _{sd-x}	Concentration @ 0% O ₂ (ppmdv)	34.6	34.1	28.3	25.2
C _{sd}	Concentration (lb/dscf)	2.76E-06	2.80E-06	2.50E-06	2.35E-06
E _{Fd}	Emission Rate - F _d -based (lb/MMBtu)	0.0343	0.0338	0.0281	0.0250
Carbon Monoxide Results					
C _{sd}	Concentration (ppmdv)	<0.489	<0.489	<0.489	<0.489
C _{sd-x}	Concentration @ 0% O ₂ (ppmdv)	<0.731	<0.712	<0.662	<0.626
C _{sd}	Concentration (lb/dscf)	<3.55E-08	<3.55E-08	<3.55E-08	<3.55E-08
E _{Fd}	Emission Rate - F _d -based (lb/MMBtu)	<4.42E-04	<4.30E-04	<4.00E-04	<3.78E-04

For CO, '<' indicates a measured response below the detection limit (assumed to be 1% of the instrument calibration span).

RESULTS**Table 2-4 (Continued):
CCR Interheater Stack – CO & NO_x Emissions (USEPA 7E/10)**

Run No.		6	7	8	9
Date (2015)		Jul 23	Jul 23	Jul 23	Jul 23
Start Time (approx.)		15:57	16:28	17:02	17:41
Stop Time (approx.)		16:18	16:49	17:23	18:02
Process Conditions					
P ₁	Fuel gas flow rate (Mscf/day)	2,298	2,293	2,322	2,311
P ₂	Charge rate (bpd)	20,999	21,000	20,993	20,996
F _d	Oxygen-based F-factor (dscf/MMBtu)	8,315	8,315	8,315	8,315
H _i	Actual heat input (MMBtu/hr)	107	106	108	107
Gas Conditions					
O ₂	Oxygen (dry volume %)	4.5	4.5	4.4	4.4
CO ₂	Carbon dioxide (dry volume %)	9.6	9.6	9.6	9.6
Nitrogen Oxides Results					
C _{sd}	Concentration (ppmdv)	19.2	18.8	18.8	18.6
C _{sd-x}	Concentration @ 0% O ₂ (ppmdv)	24.5	23.9	23.8	23.5
C _{sd}	Concentration (lb/dscf)	2.29E-06	2.24E-06	2.24E-06	2.22E-06
E _{Fd}	Emission Rate - F _d -based (lb/MMBtu)	0.0243	0.0238	0.0236	0.0233
Carbon Monoxide Results					
C _{sd}	Concentration (ppmdv)	<0.489	<0.489	<0.489	<0.489
C _{sd-x}	Concentration @ 0% O ₂ (ppmdv)	<0.623	<0.623	<0.618	<0.619
C _{sd}	Concentration (lb/dscf)	<3.55E-08	<3.55E-08	<3.55E-08	<3.55E-08
E _{Fd}	Emission Rate - F _d -based (lb/MMBtu)	<3.77E-04	<3.77E-04	<3.74E-04	<3.74E-04

For CO, '<' indicates a measured response below the detection limit (assumed to be 1% of the instrument calibration span).

RESULTS**Table 2-4 (Continued):
CCR Interheater Stack – CO & NO_x Emissions (USEPA 7E/10)**

Run No.		10*	11	12	Average
Date (2015)		Jul 23	Jul 23	Jul 23	
Start Time (approx.)		18:14	18:58	19:30	
Stop Time (approx.)		18:35	19:19	19:51	
Process Conditions					
P ₁	Fuel gas flow rate (Mscf/day)	2,345	2,289	2,291	2,229
P ₂	Charge rate (bpd)	21,000	20,999	21,004	20,395
F _d	Oxygen-based F-factor (dscf/MMBtu)	8,315	8,315	8,315	8,315
H _i	Actual heat input (MMBtu/hr)	109	106	106	103
Gas Conditions					
O ₂	Oxygen (dry volume %)	4.1	4.4	4.5	4.9
CO ₂	Carbon dioxide (dry volume %)	9.8	9.7	9.6	9.4
Nitrogen Oxides Results					
C _{sd}	Concentration (ppmdv)	17.8	18.2	18.6	19.7
C _{sd-x}	Concentration @ 0% O ₂ (ppmdv)	22.1	23.0	23.6	26.1
C _{sd}	Concentration (lb/dscf)	2.13E-06	2.17E-06	2.22E-06	2.36E-06
E _{Fd}	Emission Rate - F _d -based (lb/MMBtu)	0.0220	0.0228	0.0234	0.0259
Carbon Monoxide Results					
C _{sd}	Concentration (ppmdv)	<0.489	<0.489	<0.489	<0.489
C _{sd-x}	Concentration @ 0% O ₂ (ppmdv)	<0.607	<0.618	<0.622	<0.642
C _{sd}	Concentration (lb/dscf)	<3.55E-08	<3.55E-08	<3.55E-08	<3.55E-08
E _{Fd}	Emission Rate - F _d -based (lb/MMBtu)	<3.67E-04	<3.74E-04	<3.76E-04	<3.88E-04

Average for CO results includes 10 runs (runs 2 & 10 are not included in the average). Average includes 11 runs for all other data (run 2 is not included in the average).

For CO, '<' indicates a measured response below the detection limit (assumed to be 1% of the instrument calibration span).

For all calculated averages, "<" values are treated as the entire value of the detection limit.

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RESULTS

**Table 2-5:
CCR Interheater Stack – O₂ RATA (USEPA 3A / PS3)**

Run No.	Start Time	Date (2015)	RM Data (%dv)	CEMS Data (%dv)	Difference (%dv)	Difference Percent
1	11:28	Jul 23	6.93	7.29	-0.36	-5.2%
2 *	12:03	Jul 23	6.73	7.20	-0.47	-7.0%
3	13:18	Jul 23	6.54	6.91	-0.37	-5.7%
4	14:51	Jul 23	5.46	5.84	-0.38	-7.0%
5	15:24	Jul 23	4.58	5.00	-0.42	-9.2%
6	15:57	Jul 23	4.51	4.94	-0.43	-9.5%
7	16:28	Jul 23	4.50	4.92	-0.42	-9.3%
8	17:02	Jul 23	4.37	4.81	-0.44	-10.1%
9 *	17:41	Jul 23	4.38	4.85	-0.47	-10.7%
10 *	18:14	Jul 23	4.07	4.53	-0.46	-11.3%
11	18:58	Jul 23	4.37	4.79	-0.42	-9.6%
12	19:30	Jul 23	4.47	4.92	-0.45	-10.1%
Average			5.08	5.49	-0.41	-8.1%

Relative Accuracy Test Audit Results

Standard Deviation of Differences 0.032
Confidence Coefficient (CC) 0.025
t-Value for 9 Data Sets 2.306

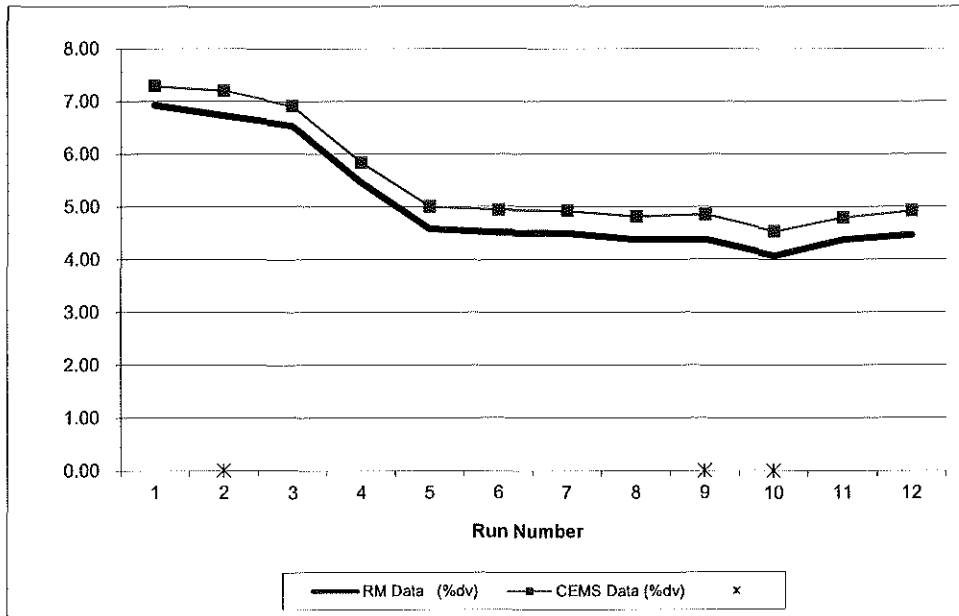
Avg. Abs. Diff. (%dv) 0.41 Limit 1.0

RM = Reference Method (CleanAir Data)

090115 145237

CEMS = Continuous Emissions Monitoring System (Marathon Petroleum Company Data)

RATA calculations are based on 9 of 12 runs. * indicates the excluded runs.



RESULTS

**Table 2-6:
CCR Interheater Stack – NO_x (ppmdv) RATA (USEPA 7E / PS2)**

Run No.	Start Time	Date (2015)	RM Data (ppmdv)	CEMS Data (ppmdv)	Difference (ppmdv)	Difference Percent
1	11:28	Jul 23	23.12	22.12	1.00	4.3%
2 *	12:03	Jul 23	23.08	22.19	0.89	3.9%
3 *	13:18	Jul 23	23.42	21.42	2.00	8.5%
4	14:51	Jul 23	20.93	20.04	0.89	4.3%
5	15:24	Jul 23	19.65	18.88	0.77	3.9%
6	15:57	Jul 23	19.21	18.45	0.76	4.0%
7	16:28	Jul 23	18.77	18.09	0.68	3.6%
8	17:02	Jul 23	18.79	17.73	1.06	5.6%
9	17:41	Jul 23	18.58	17.62	0.96	5.2%
10	18:14	Jul 23	17.83	16.79	1.04	5.8%
11	18:58	Jul 23	18.16	17.50	0.66	3.6%
12 *	19:30	Jul 23	18.55	17.40	1.15	6.2%
Average			19.45	18.58	0.87	4.5%

Relative Accuracy Test Audit Results

Standard Deviation of Differences 0.155
Confidence Coefficient (CC) 0.119
t-Value for 9 Data Sets 2.306

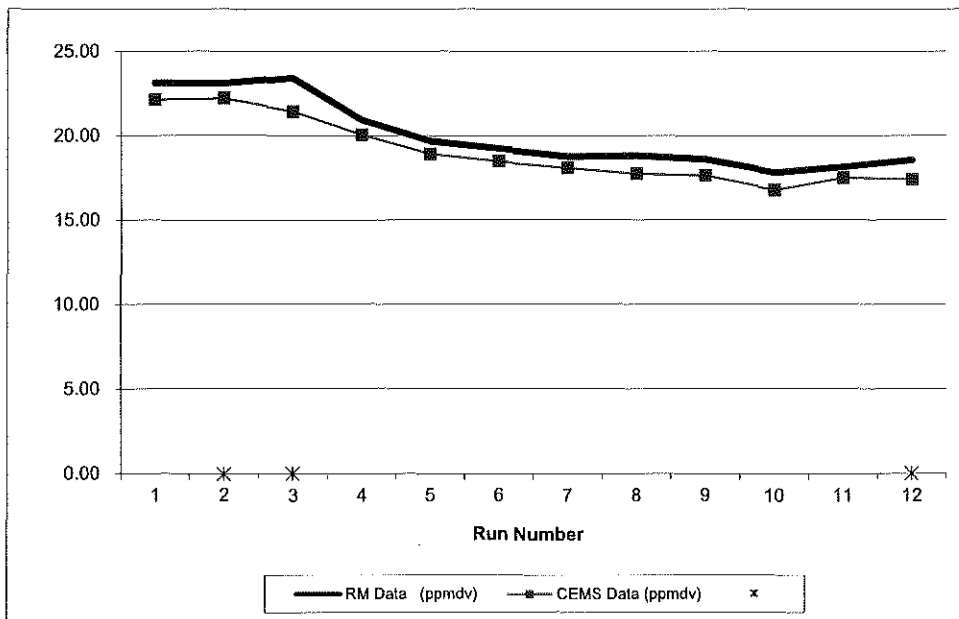
Relative Accuracy (as % of RM) 5.1% Limit 20.0%

RM = Reference Method (CleanAir Data)

090115 145237

CEMS = Continuous Emissions Monitoring System (Marathon Petroleum Company Data)

RATA calculations are based on 9 of 12 runs. * indicates the excluded runs.



RESULTS

**Table 2-7:
CCR Interheater Stack – NO_x (lb/MMBtu) RATA (USEPA 7E / PS2)**

Run No.	Start Time	Date (2015)	RM Data (lb/MMBtu)	CEMS Data (lb/MMBtu)	Difference (lb/MMBtu)	Difference Percent
1	11:28	Jul 23	0.03	0.03	0.00	0.0%
2 *	12:03	Jul 23	0.03	0.03	0.00	0.0%
3	13:18	Jul 23	0.03	0.03	0.00	0.0%
4	14:51	Jul 23	0.03	0.03	0.00	0.0%
5 *	15:24	Jul 23	0.02	0.03	-0.01	-50.0%
6	15:57	Jul 23	0.02	0.02	0.00	0.0%
7	16:28	Jul 23	0.02	0.02	0.00	0.0%
8	17:02	Jul 23	0.02	0.02	0.00	0.0%
9	17:41	Jul 23	0.02	0.02	0.00	0.0%
10	18:14	Jul 23	0.02	0.02	0.00	0.0%
11	18:58	Jul 23	0.02	0.02	0.00	0.0%
12	19:30	Jul 23	0.02	0.02	0.00	0.0%
Average			0.02	0.02	0.00	0.0%

Relative Accuracy Test Audit Results

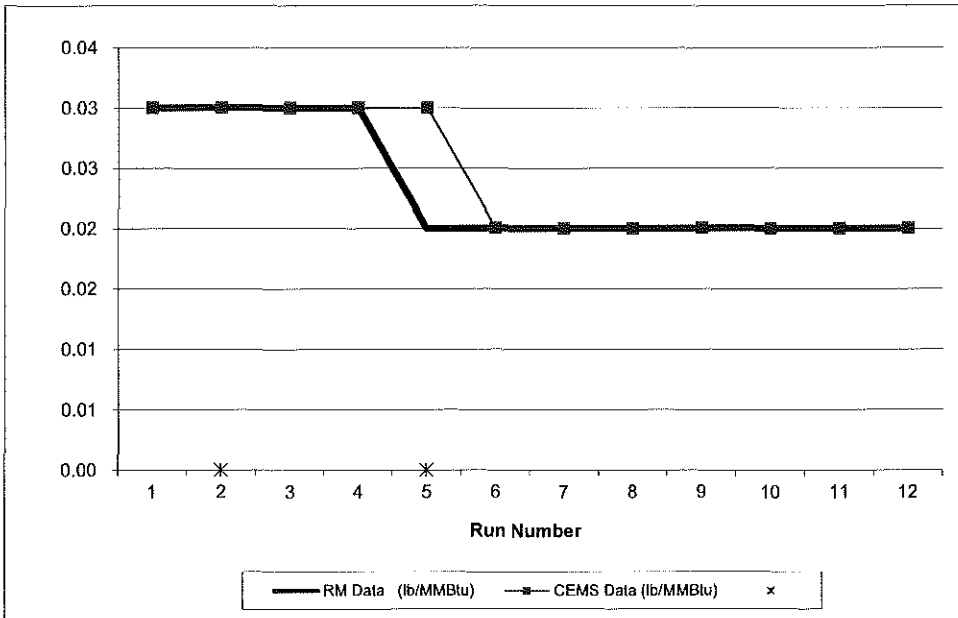
Standard Deviation of Differences	0.000	
Confidence Coefficient (CC)	0.000	
t-Value for 10 Data Sets	2.262	
		Limit
Relative Accuracy (as % of RM)	0.0%	20.0%
Relative Accuracy (as % of Appl. Std.)	0.0%	10.0%
Appl. Std. = 0.05 lb/MMBtu		

RM = Reference Method (CleanAir Data)

090115 145237

CEMS = Continuous Emissions Monitoring System (Marathon Petroleum Company Data)

RATA calculations are based on 10 of 12 runs. * indicates the excluded runs.



RESULTS

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**Table 2-8:
CCR Interheater Stack – CO (ppmdv) RATA (USEPA 10 / PS4A)**

Run No.	Start Time	Date (2015)	RM Data (ppmdv)	CEMS Data (ppmdv)	Difference (ppmdv)
1	11:28	Jul 23	0.00	0.00	0.00
2 *	12:03	Jul 23	N/A	0.00	N/A
3	13:18	Jul 23	0.14	0.00	0.14
4	14:51	Jul 23	0.16	0.00	0.16
5	15:24	Jul 23	0.00	0.00	0.00
6	15:57	Jul 23	0.00	0.00	0.00
7	16:28	Jul 23	0.00	0.00	0.00
8	17:02	Jul 23	0.00	0.00	0.00
9	17:41	Jul 23	0.00	0.00	0.00
10 *	18:14	Jul 23	0.00	0.00	0.00
11 *	18:58	Jul 23	0.16	0.00	0.16
12	19:30	Jul 23	0.00	0.00	0.00
Average			0.03	0.00	0.03

Relative Accuracy Test Audit Results

Standard Deviation of Differences	0.066	
Confidence Coefficient (CC)	0.051	
t-Value for 9 Data Sets	2.306	
		Limit
Avg. Abs. Diff. + CC (ppmdv)	0.08	5.0

RM = Reference Method (CleanAir Data)

090115 145907

CEMS = Continuous Emissions Monitoring System (Marathon Petroleum Company Data)

RATA calculations are based on 9 of 12 runs. * indicates the excluded runs.

RESULTS

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**Table 2-9:
CCR Interheater Stack – CO (lb/MMBtu) RATA (USEPA 10 / PS4A)**

Run No.	Start Time	Date (2015)	RM Data (lb/MMBtu)	CEMS Data (lb/MMBtu)	Difference (lb/MMBtu)
1	11:28	Jul 23	0.000	0.000	0.000
2 *	12:03	Jul 23	N/A	0.000	N/A
3	13:18	Jul 23	0.000	0.000	0.000
4	14:51	Jul 23	0.000	0.000	0.000
5	15:24	Jul 23	0.000	0.000	0.000
6	15:57	Jul 23	0.000	0.000	0.000
7	16:28	Jul 23	0.000	0.000	0.000
8	17:02	Jul 23	0.000	0.000	0.000
9	17:41	Jul 23	0.000	0.000	0.000
10 *	18:14	Jul 23	0.000	0.000	0.000
11	18:58	Jul 23	0.000	0.000	0.000
12	19:30	Jul 23	0.000	0.000	0.000
Average			0.000	0.000	0.000

Relative Accuracy Test Audit Results

Standard Deviation of Differences	0.000	
Confidence Coefficient (CC)	0.000	
t-Value for 10 Data Sets	2.262	
Relative Accuracy (as % of Appl. Std.)	0.0%	Limit
Appl. Std. = 0.013 lb/MMBtu		5.0%

RM = Reference Method (CleanAir Data)

090115 154121

CEMS = Continuous Emissions Monitoring System (Marathon Petroleum Company Data)

RATA calculations are based on 10 of 12 runs. * indicates the excluded runs.

End of Section 2 – Results